EM scientific research from The Netherlands
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Abstract
The abstract includes 6 scientific researches performed in The Netherlands, Germany and Hungary.

Keywords: *EM tap water treatment, germination of tomato- and cucumber seed, Rhizoctonia Solani in sugerbeet seedlings, EM Bokashi production with wet grains, a rest product from beer breweries, EM fermentation of grass (ensilage), Effects of EM in Hungarian soils*

Introduction
Maintaining or even increasing productivity, though at a lower level of external inputs, has long been held for unfeasible. Yet, there is often much more possible than current high-input farming practices bring us to believe. Throughout the world, a variety of successful applications of sustainable agriculture shows up. Still relatively few farmers have adopted new technologies and practices. One reason is that sustainable agriculture presents a deeper and more fundamental challenge than many researchers, extensionists and policy makers haved yet supposed. Sustainable agriculture needs more than new technologies and practices. It needs agricultural professionals willing and able to learn from farmers; it needs supportive external institutions; it needs local groups and institutions of managing resources more effectively; and above all it needs agricultural policies that support these features. It also requires that we look closely at the very nature of the way we conceptualize sustainability and how it might be achieved. This all may be very true. Conventional science is just not equiped for the current task. The way humans act and think, is absolutely central to the development of agriculture, including livestock production. Unfortunately, humans do not function on facts alone.

The Wageningen Agricultural University now recognizes that the soil constitutes a natural basis of food and feed production, including livestock productions, i.e. the interactive soil-plant-animal-human system. Sustainable agriculture requires a healthy agro-ecosystem. Further research is needed to confirm whether a healthy soil could result in healthier crops, i.c. improved food safety and quality, human an animal health, and environmental quality.

Last year and this year we focused the following very grave problems in agriculture:

BSE mad cow disease, foot and mouth disease, dioxines and mycotoxines in animal and human feed, E-coli bacteria, salmonella bacteria in chicken meat and eggs.

In the past consumers were susceptible for the problems in agriculture related to the health of the environment, but now they are afraid of the quality and safety of their food. Consumers are now asking what can we still eat without being afraid of our health. So scientists, extensionists and agricultural institutions have to change their minds in order to solve the current problems. It is not possible to produce healthy and safe products in an unhealthy environment or as Dr. Higa said in his publications: If you are talking about healthy food than there is consequently also unhealthy food.

In order to show scientists, extensionists, farmers, growers and breeders the effects of EM1 and EM related products such as EM Bokashi, Agriton gave instructions to different institutes to research EM effects in agriculture.

Material and methods
Scientifical reports of materials studied, area discriptions, methods, techniques, experimental design, and statistical methods used, are available on request.

Results and discussion

Research 1: Biophotons Research Institute Prof.Dr.Fritz Albert Popp in Germany:

Prof. Popp measured normal German tap water treated with EM-X ceramics and non treated and normal German tap water treated with EM-Xand without EM-X. In both cases significant differences have been achieved with EM treated water.

Research 2: Research Station for Floriculture and Glasshouse Vegetables at Naaldwijk: Influence of Effective Micro-organisms (EM1) on germination and growth of cucumber and tomato.

Differences in germination of tomato- and cucumber seeds with and without EM1 treatment and with EM-X ceramics treated tap water and non treated tap water.

Germination test of tomato- and cucumber seeds with and without EM. Duration 14 days.

	EM1	Chemical fertilizer	Weight of roots
Treatment 1	0	0	96 mg/plant
Treatment 2	0	+	716 mg/plant
Treatment 3	10 ml EM1	0	7 mg/plant
Treatment 4	50 ml EM1	0	23 mg/plant
Treatment 5	150 ml EM1	0	9 mg/plant
Treatment 6	50 ml EM1	+	1016 mg/plant

Germination: 97.9% for all treatments.
Conclusion: EM1 + chemical fertilizers gave the best result.

Research 3: IRS Institute for Rational Sugar production at Bergen op Zoom. Controlling development of Rhizoctonia Solani in sugarbeet seedlings by EM1 and EM Bokashi.

Introduction: The disease inducing mould Rhizoctonia solani causes an ever increasing threatening for cultivation of sugarbeets.This mould brings about damage to young sugarbeet plants when soil temperature is rising in early spring.This disease can destroy complete sugarbeet fields. Chemical control is not sufficient and socially unwished. Microbial enrichment of the soil can improve the growth of sugarbeets by which these plants will be less susceptible for infections.

Test results 4 weeks after sowing.

	Inoculation Density	Bokashi Weight %	EM-1 T1 T0 T1-4	23 degrees Celsius number of healthy Plants in greenhouse
Treatment 1	0	0	- - -	100
Treatment 2	0.5	0	- - -	21
Treatment 3	1.0	0	- - -	33
Treatment 4	0	0	- - -	99
Treatment 5	0.5	0	- - -	32
Treatment 6	1.0	0	- - -	31
Treatment 7	0	5	+ - -	91
Treatment 8	0,5	5	+ - -	86
Treatment 9	1.0	5	+ - -	66
Treatment 10	0	5	+ + +	95
Treatment 11	0.5	5	+ + +	73
Treatment 12	1.0	5	+ + +	73

Conclusion: Addition of EM Bokashi and EM1has a suppressing effect on Rhizoctonia solani moulds.

Research 4: Research Station for Floriculture and Glashouse Vegetables at Noordwijk
Lettuce seedlings test with Bokashi made from of wet grains of beer breweries.

Fertilizers: All plots got 7 kilograms Potassium and 4 kilograms Calcium Ammonium Salpeter (27% Nitrogen).

		Tons/ha	Kilograms Organic matter
Treatment A	Control	---	---
Treatment B	Standardwet grains	24	5900
Treatment C	Fresh wet grainas	30	7100
Treatment D	EM Bokashi	4	1600
Treatment E	Squeezed wet grains	15,6	7000

Treatment D and E got 2 EM1 sprays and a standard chemical plant protection product.

Measured organic matter in the soil, yield and Nitrogen in the lettuce plants:

	Org. Matter	Yield	Nitrogen in mmol/kg/dry matter	
Treatment A	4.7	366.2 grams	3643	
Treatment B	5.0	359.0 grams	3571	
Treatment C	5.0	354.8 grams	3643	
Treatment D	5.1	356.3 grams	3500	lowest content of Nitrogen
Treatment E	4.9	352.2 grams	3642	

Conclusion: Only 4 tons of EM Bokashi per hectare gave the same and/or slightly better results than 30 tons of fresh organic matter.
All treatments show heavy lettuce plants.

Research 5: Research Institute Animal Health at Lelystad.
Fresh grass fermented with EM-A and EM-Silage (ensilage).

This research consists of 2 parts:

Part 1: To determine the minimal required incubation time and incubation temperature of EM-A as an inocolant for ensilage of fresh grass. During a ten days incubation with 3 temperatures (15, 20 and 25 degrees Celsius) the number of lactic acid bacteria in EM-A has been observed.

Part 2: To determine the positive effect of EM-A and EM Silage during the silage process for the production and fermentation of Dutch grass silage.Two laboratory samples of silage have been made and the effect of EM-A and EM Silage have been observed with respect to the initial fermentation (pH decrease after 6 days of incubation) and the final product (composition of the microflora, fermentation profile and aerobic stability) .

	After 2 months of incubation		
	CON	EM Silage	EM-A
Loss of weight (g/kg)	39.0a	25.8b	23.9b
PH	5.88a	4.36b	4.29b
Aerobic stability (hours)	60a	>525b	>525b

Conclusion: Treatment of grass with EM-A and EM Silage during ensiling had in this experiment a very clear and positive effect on the final pH and the aerobic stability of grass ensilage. EM-A had also a clear and positive effect on the initial acidifying velocity (after 6 days).

The aerobic stability of the grass ensilage after two months incubation: the control ensilage got heated already after 60 hours.The EM treated ensilages kept their aerobic stability for more than three weeks.

Research 6: Research Institute for Soil Science and Agricultural Chemistry, Budapest, Hungary by Dr. Attila Murányi.

The Effects of EM1 in soils.

Dehydrogenase activity of EM1, the cellulose decomposing activity of EM1, the effect of EM1on natural soil respiration, the effect of EM1 on germination and the effects of EM1 on plant production.

Conclusions:
EM Effective Micro-organisms can significantly influence the biological activity of soils, the germination of seeds and the plant production. However, the overall effect is determined by biological, chemical and physical factors too. It follows from this, that, the integration of EM Effective Micro-organisms into ecological, agricultural and environmental sciences requires a brand new approach. This concept should unite the ecological approach and the engineering practice. As a consequence of this EM Effective Micro-organisms can beconsidered as the fundament of the Ecological – Engineering Science.